

User's Manual

DIAS-LS Lightning Shunt System

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**Adding value by delivering useful
knowledge through the innovation,
intellect and commitment of our team**



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Limited Warranty, Limitations of Liability and Restrictions

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Dias ASSUMES NO LIABILITY FOR ANY DIRECT, INDIRECT, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES OR INJURIES CAUSED BY PROPER OR IMPROPER OPERATION OF ITS EQUIPMENT, WHETHER OR NOT DEFECTIVE.

1.0 Introduction

This manual is designed to provide instruction for the use and maintenance of the DIAS-LS lightning shunt system. The DIAS-LS system is intended to augment, and integrate with, a well-designed set of field safety practices and procedures for electrical storms. These safety measures should include protocols during the approach, activity and departure of electrical storms for both personnel and equipment. It is intended as both a reference and a teaching tool and it is recommended that you read the entire document. If you experience operational problems with your system, please call technical support at +1 (306) 249-4422.

1.1 Unpacking Your System

Thank you for purchasing a DIAS-LS system. A packing list is included with your shipment that identifies all of the items that are in your order. You should check your shipment against the packing list upon receipt of your shipment. If you find that an item is missing or was damaged during the shipment, please call Dias immediately so that we can correct the problem. Following is a list of items that are included with your shipment:

- DIAS-LS lightning shunt box complete with connectors and internal battery
- Supply of banana-style connectors for attaching the ground wire and the two line wires
- Ground wire – 3 m
- 'High Voltage' high-visibility tape
- Carrying bag

1.2 General Description

The DIAS-LS is a lightweight, portable, single channel technology that is designed to mitigate the effects of lightning activity within the extents of a geophysical survey. Many ground and some borehole and airborne geophysical surveys involve the laying of extensive amounts of conductive wire through the survey area. This wire can act as a collector of electrical energy during electrical storms. And any such electrical energy that enters the geophysical system in this way can be transmitted throughout the survey area and compromise the safety of personnel and equipment. The DIAS-LS units are intended to be deployed at strategic positions along the conductive survey wires to disrupt the transmission of this dangerous electrical energy.

We highly recommend that the DIAS-LS technology be integrated into a field safety system that addresses all aspects of the dangers of electrical storms.

The DIAS-LS unit is a small, rugged, self-contained device that can be easily and quickly deployed with minimal training. There are three versions of the DIAS-LS system as follows:

1. DIAS-LS-DCt – for use on direct current (DC) resistivity surveys or DC resistivity and induced polarization (IP) surveys. The units are installed on the transmitter (current transmission) survey wires. We recommend that one be installed near the current 'infinite'

site, a minimum of 100 m away from the transmitter and generator setup, and another near the edge of the survey area.

2. DIAS-LS-DCr – for use on direct current (DC) resistivity surveys or DC resistivity and induced polarization (IP) surveys. The units are installed on the receiver (voltage) survey wires. We recommend that one be installed near the edge of the survey area, a minimum of 100 m away from the nearest receiver box, and another approximately half-way between the survey area and the 'infinite' site (for pole-pole surveys).
3. DIAS-LS-EM - for use on large, fixed loop electromagnetic (FLEM) surveys. The units are installed on the transmitter loop wire(s). We recommend that one unit be installed approximately 100 m on either side of the generator/transmitter set-up.

1.3 Connectors and Indicators

The external features of the unit are shown in the following image of the top plate of the DIAS-LS box.

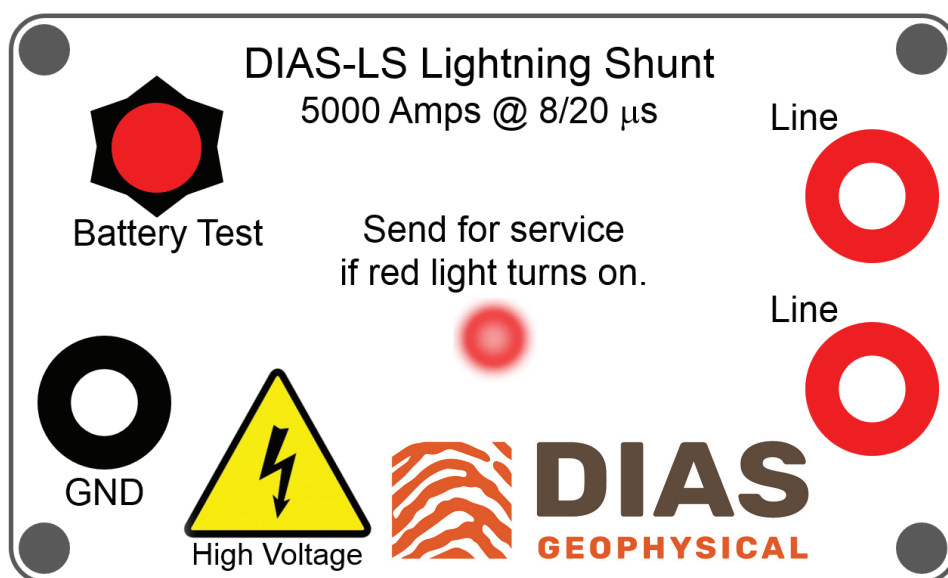


Figure 1: DIAS-LS interface layout.

Line Connectors: Two line connectors labelled as 'Line' are on the right-hand side of the device. These connectors take the input line and output line from the survey wire. There is no distinction between line IN and line OUT; the survey wire can be connected with any polarity. We recommend that the survey wire be connected to the Line connectors using banana plug connectors (provided) and that all bare connections be properly insulated with electrical tape.

Ground Connector: The ground connector, a black banana-style connector located on the lower left portion of the box, must be hooked up to a wire that leads to a local grounded electrode. We recommend that the ground wire be connected to the ground connector



using a banana-style plug connector (provided) and that all bare connections be properly insulated.

Battery Test: A red button on the top left of the device can be depressed to determine if the internal battery is sufficiently charged. While the internal battery is not required for the fundamental functioning of the lightning shunt unit, the battery must be sufficiently charged in order to determine whether the functioning of the device has been compromised by prior lightning activity. The battery status LED is located to the right of the battery test button. If this green LED does not light when the test button is depressed, the unit should be tagged as non-serviceable and sent to Dias for servicing.

Service Indicator Light: The fault/service indicator light is mounted beneath the surface in the centre of the box. It is clearly visible through the surface when lit. If the light is on, a fault condition has been detected, and the box should be disconnected from the survey wire and ground wire, and replaced with a serviceable DIAS-LS unit. The faulty unit should be tagged as non-serviceable and sent to Dias for servicing.

1.4 Field Procedures

Following is a step-by-step description of the procedure for use of the DIAS-LS Lightning Shunt technology.

1. **Pre-survey prep:** Prior to mobilization to the survey site, determine the type(s) and number of DIAS-LS units that will be required for the survey. We recommend 2 to 4 spares for each unit that is to be deployed on the survey. In a location or time period that the lightning activity is expected to be low, we recommend 2 spares per installed unit, and when the lightning activity is expected to be high, we recommend 4 spares per unit.
2. **Testing:** Confirm that all units are serviceable prior to mobilization by checking for a fault condition and testing the battery. If the fault indicator light is on, send the unit for servicing. Depress the Battery Test light to check the condition of the battery. If the battery is serviceable, the green battery test indicator will light up while the battery test button is depressed.
3. **Installation check-list:** For each unit to be installed, ensure that you have 3 banana-style connectors, (two for the line connections, and one for the ground connection), a ground electrode (a steel rod is recommended), electrical tape, and high-visibility warning tape. Wire cutters, hammer, gloves, etc. are also recommended.
4. **Site selection:** The installation site should be chosen according to the general instructions given in Section 1.2 above. In addition, the site should be in an environment where good electrical contact with the ground can be established. This may be in swampy, or low-lying ground, or where there is sufficient conductive overburden. The site should also be in an area where there will be limited human or wildlife activity. The site should also be in a convenient survey location to facilitate daily service checks.
5. **Installation:**
 - a. Place the DIAS-LS unit in a dry, secure location, preferably above ground surface. Cut the survey wire and secure each side of the survey wire to a branch or ground

stake to mitigate inadvertent disconnection of the circuit from human or wildlife activity along the survey wire.

- b. Install the ground electrode (if it is a steel rod, hammer it into the ground) within 3 m of the DIAS-LS unit, and attach the ground lead wire to the electrode.
- c. Attach the other end of the ground lead wire to the black banana-style plug labeled 'GND' on the DIAS-LS unit.
- d. Attach the two survey wires to the red banana-style connectors labeled 'Line' on the DIAS-LS unit using banana-style plugs, and insulate any bare sections of wire using electrical tape.
- e. Check the fault indicator light to ensure that the DIAS-LS unit is serviceable. Depress the Battery Check button to ensure that the battery is sufficiently charged.
- f. Install safety signs as required by local authorities and recommended by safety associations.



6. **Daily Checks:** We recommend that all installed DIAS-LS units be checked for fault condition and battery performance on a daily basis to verify that the system is functioning properly for the intended protection of crew and equipment.



Figure 2: Sample DIAS-LS Installation in a typical boreal forest environment.



1.5 Support

Dias Geophysical provides full support for the DIAS-LS technology. Technical support is available by calling +1 (306) 249-4422 and asking for Dias Technical Support Services. Unserviceable units can be packed and shipped to the following address:

Dias Geophysical
2131 Airport Drive,
Saskatoon, SK,
S7L 7E1 Canada

Please visit our website at www.diasgeo.com for further contact information.

